We Claim:

1. A method for determining a modulator of neuropeptide Y receptor associated bone remodeling comprising:

(vii) determining the level of neuropeptide Y receptor associated bone remodeling in the presence of a candidate compound; and

(viii) determining the level of neuropeptide Y receptor associated bone remodeling in the absence of a candidate compound,

wherein a difference in the level of said neuropeptide Y receptor associated bone remodeling at (i) and (ii) indicates that the candidate compound is a modulator of Y receptor associated bone remodeling.

2. The method of claim 1 comprising:

(i) determining the level of neuropeptide Y receptor activity and/or expression and the level of bone remodeling in the presence of a candidate compound; and

(ii) determining the level of neuropeptide Y receptor activity and/or expression and the level of bone remodeling in the absence of a candidate compound,

wherein a difference in the level of said neuropeptide Y receptor activity and/or expression and a difference in the level of bone remodeling at (i) and (ii) indicates that the candidate compound is a modulator of Y receptor associated bone remodeling.

3. The method of claim 2 further comprising isolating cells from an animal subject and then determining Y receptor activity and/or expression in the presence and absence of the compound using the isolated cells.

4. The method of claim 2 further comprising administering the compound to an animal subject isolating cells from an animal subject and then determining Y receptor activity and/or expression in the isolated cells.

5. The method according to claim 3 or 4 wherein Y receptor activity is determined by performing a process comprising contacting a receptor ligand with the cells in the presence and absence of the compound under conditions sufficient for the ligand to

bind to a Y receptor expressed in said cells and determining the binding of the ligand to the Y receptor wherein a difference in binding in the presence and absence of the compound indicates that the compound is a modulator of Y receptor activity.

6. The method of claim 5 wherein the ligand is labeled with a detectable marker.

7. The method of claim 5 or 6 wherein the ligand is selected from the group consisting of neuropeptide Y (NPY), pancreatic polypeptide and peptide YY (PYY).

8. The method according to claim 3 or 4 wherein Y receptor activity is determined by performing a process comprising exposing the cells to an amount of forskolin sufficient in the presence and absence of the compound to induce cAMP accumulation in the cells and determining the amount of cAMP in the cells wherein a difference in cAMP in the presence and absence of the compound indicates that the compound is a modulator of Y receptor activity.

9. The method of claim 3 or 4 wherein Y receptor activity is determined by performing a process comprising determining calcium mobilization in the cells wherein a difference in calcium mobilization in the presence and absence of the compound indicates that the compound is a modulator of Y receptor activity.

10. The method of claim 9 wherein calcium mobilization is determined by contacting the cells with a cell-permeable marker that binds intracellular free Ca^{2+} under conditions sufficient for the marker to permeate the cells and then determining the intracellular amount of $Ca2^{+}$ bound to the marker.

11. The method of claim 10 wherein the cell-permeable marker is a fluorescently-labeled marker.

12. The method of claim 2 further comprising isolating bone tissue from an animal subject and then determining bone remodeling in the presence and absence of the compound using the isolated bone tissue or an organ culture derived there from.

13. The method of claim 12 further comprising culturing the bone tissue to produce an organ culture.

14. The method of claim 2 further comprising administering the compound to an animal subject, isolating bone tissue from an animal subject and then determining bone remodeling in the isolated bone tissue.

15. The method according to any one of claims 12 to 14 wherein the bone tissue comprises calvarial (skullcap) bone tissue.

16. The method according to any one of claims 12 to 14 wherein the bone tissue comprises femur bone tissue.

17. The method according to any one of claims 12 to 16 comprising measuring a parameter in the bone tissue or organ culture derived there from wherein a difference in the measurement of the parameter in the presence and absence of the compound indicates that the compound is a modulator of bone remodeling, and wherein the parameter is selected from the group consisting of bone thickness, amount of new bone, rate of formation of new bone, osteoblast number, osteoclast number, cell proliferation, degree of apoptosis, cortical area, cortical thickness, mineralized bone content, trabecular bone volume, trabecular thickness, trabeculae number, and mineral apposition rate.

18. The method of claim 17 wherein the parameter is selected from the group consisting of rate of formation of new bone, osteoblast number, osteoclast number, cortical area, cortical thickness, trabecular bone volume, trabecular thickness, trabeculae number, and mineral apposition rate.

19. A method for determining a modulator of neuropeptide Y receptor associated bone remodeling comprising administering a modulator of bone remodeling to an animal subject and determining a change in Y receptor activity, wherein a modified Y receptor activity in the presence of the compound compared to the Y receptor activity in the absence of the compound indicates that the compound is a modulator of Y receptor associated bone remodeling.

20. A method for determining a modulator of neuropeptide Y receptor associated bone remodeling comprising administering a modulator of Y receptor activity and/or expression to an animal subject and determining a change in bone remodeling activity, wherein a modified bone remodeling activity in the presence of the compound compared to the bone remodeling activity in the absence of the compound indicates that the compound is a modulator of Y receptor associated bone remodeling.

21. The method according to any one of claims 3 to 20 wherein the animal subject has a level of bone remodeling activity that is about the same as an animal subject that has not been treated with a compound that modulates bone remodeling or has not been modified at the genetic level to reduce expression of a Y receptor-encoding gene other than a Y4 receptor.

22. The method according to any one of claims 3 to 20 wherein the animal subject has been modified at the genetic level to reduce expression of a Y receptor-encoding gene thereby enhancing its sensitivity to a modulator of bone remodeling activity.

23. The method of claim 22 wherein the animal subject has been modified at the genetic level to reduce expression of a Y4 receptor-encoding gene in at least one tissue thereof.

24. The method according to any one of claims 3 to 23 wherein the animal subject is an aged animal subject.

25. The method according to any one of claims 3 to 24 wherein the animal subject suffers from a bone disease characterized by aberrant bone remodeling activity.

26. The method of claim 25 wherein the animal subject suffers from a bone disease selected from the group consisting of osteomalacia, hyperostosis and osteoporosis.

27. The method of claim 26 wherein the bone disease is osteoporosis.

28. The method according to any one of claims 3 to 27 wherein the animal subject is a gonadectomized animal subject.

29. The method according to any one of claims 3 to 28 wherein the animal subject is a male subject.

30. The method according to any one of claims 3 to 29 wherein the animal subject is selected from the group consisting of rat, mouse, chimpanzee, chicken, guinea pig, rabbit, bovine, sheep, and zebrafish.

31. The method of claim 30 wherein the animal subject is a mouse.

32. The method according to any one of claims 1 to 31 wherein the Y receptor associated bone remodeling is associated with a Y receptor that is expressed external to the parenchyma of the central nervous system of an animal.

33. The method according to claim 33 wherein the Y receptor is at least expressed in the arcuate nucleus of an animal.

34. The method according to any one of claims 1 to 33 wherein the bone remodeling is associated with the activity and/or expression of one or more Y receptors selected from the group consisting of:

(i) a Y1 receptor;

(ii) a Y5 receptor;

(iii) a Y7 receptor;

(iv) a Y1 receptor and a Y2 receptor;

(v) a Y1 receptor and a Y5 receptor;

(vi) a Y1 receptor and a Y7 receptor;

(vii) a Y2 receptor and a Y5 receptor;

(viii) a Y2 receptor and a Y7 receptor;

(ix) a Y5 receptor and a Y7 receptor;

(x) a Y1 receptor and a Y2 receptor and a Y5 receptor;

(xi) a Y1 receptor and a Y2 receptor and a Y7 receptor;

(xii) a Y1 receptor and a Y5 receptor and a Y7 receptor; and

(xiii) a Y1 receptor and a Y2 receptor and a Y5 receptor and a Y7 receptor.

35. The method according to any one of claims 1 to 33 wherein the bone remodeling is at least associated with the activity and/or expression of a Y1 receptor.

36. The method according to claim 35 wherein the bone remodeling is associated with the activity and/or expression of one or more Y receptors selected from the group consisting of:

(i) a Y1 receptor; and

(ii) a Y1 receptor and a Y2 receptor.

37. The method according to any one of claims 1 to 36 further comprising determining the ability of the compound to pass across the blood brain barrier of an animal subject and selecting a compound that does not efficiently pass the blood brain barrier.

38. The method according to any one of claims 1 to 37 wherein the compound is a small molecule, nucleic acid, protein or antibody that antagonizes the activity and/or expression of a Y receptor.

39. The method of claim 38 wherein the nucleic acid comprises siRNA, PNA, RNAi, ribozyme or antisense RNA.

40. A method for determining a modulator of neuropeptide Y receptor associated bone growth comprising:

(ix) determining the level of neuropeptide Y receptor associated bone growth in the presence of a candidate compound; and

(x) determining the level of neuropeptide Y receptor associated bone growth in the absence of a candidate compound,

wherein a difference in the level of said neuropeptide Y receptor associated bone growth at (i) and (ii) indicates that the candidate compound is a modulator of Y receptor associated bone growth.

41. The method of claim 40 comprising:

(i) determining the level of neuropeptide Y receptor activity and/or expression and the level of bone growth in the presence of a candidate compound; and

(ii) determining the level of neuropeptide Y receptor activity and/or expression and the level of bone growth in the absence of a candidate compound,

wherein a difference in the level of said neuropeptide Y receptor activity and/or expression and a difference in the level of bone growth at (i) and (ii) indicates that the candidate compound is a modulator of Y receptor associated bone growth.

42. The method of claim 41 further comprising isolating cells from an animal subject and then determining Y receptor activity and/or expression in the presence and absence of the compound using the isolated cells, wherein the animal subject is a juvenile or immature subject or a subject that has not attained sexual maturity or in which the bone remodeling phase has not been attained.

43. The method of claim 41 further comprising administering the compound to an animal subject, isolating cells from an animal subject and then determining Y receptor

activity and/or expression in the isolated cells, wherein the animal subject is a juvenile or immature subject or a subject that has not attained sexual maturity or in which the bone remodeling phase has not been attained.

44. The method according to claim 42 or 43 wherein Y receptor activity is determined by performing a process comprising contacting a receptor ligand with the cells in the presence and absence of the compound under conditions sufficient for the ligand to bind to a Y receptor expressed in said cells and determining the binding of the ligand to the Y receptor wherein a difference in binding in the presence and absence of the compound indicates that the compound is a modulator of Y receptor activity.

45. The method of claim 44 wherein the ligand is labeled with a detectable marker.

46. The method of claim 44 or 45 wherein the ligand is selected from the group consisting of neuropeptide Y (NPY), pancreatic polypeptide and peptide YY (PYY).

47. The method according to claim 42 or 43 wherein Y receptor activity is determined by performing a process comprising exposing the cells to an amount of forskolin sufficient in the presence and absence of the compound to induce cAMP accumulation in the cells and determining the amount of cAMP in the cells wherein a difference in cAMP in the presence and absence of the compound indicates that the compound is a modulator of Y receptor activity.

48. The method of claim 42 or 43 wherein Y receptor activity is determined by performing a process comprising determining calcium mobilization in the cells wherein a difference in calcium mobilization in the presence and absence of the compound indicates that the compound is a modulator of Y receptor activity.

49. The method of claim 48 wherein calcium mobilization is determined by contacting the cells with a cell-permeable marker that binds intracellular free Ca^{2+}

under conditions sufficient for the marker to permeate the cells and then determining the intracellular amount of $Ca2^{+}$ bound to the marker.

50. The method of claim 49 wherein the cell-permeable marker is a fluorescently-labeled marker.

51. The method of claim 41 further comprising isolating bone tissue from an animal subject and then determining bone growth in the presence and absence of the compound using the isolated bone tissue or an organ culture derived there from.

52. The method of claim 51 further comprising culturing the bone tissue to produce an organ culture.

53. The method of claim 41 further comprising administering the compound to an animal subject, isolating bone tissue from an animal subject and then determining bone growth in the isolated bone tissue.

54. The method according to any one of claims 51 to 53 wherein the bone tissue comprises calvarial (skullcap) bone tissue.

55. The method according to any one of claims 51 to 53 wherein the bone tissue comprises femur bone tissue.

56. The method according to any one of claims 51 to 55 comprising measuring a parameter in the bone tissue or organ culture derived there from wherein a difference in the measurement of the parameter in the presence and absence of the compound indicates that the compound is a modulator of bone length, bone growth, and wherein the parameter is selected from the group consisting of bone thickness, amount of new bone, rate of formation of new bone, osteoblast number, osteoclast number, cell proliferation, degree of apoptosis, cortical area, cortical thickness, mineralized bone

content, cancellous bone volume, trabecular bone volume, trabecular thickness, trabeculae number, and mineral apposition rate.

57. The method of claim 56 wherein the parameter is selected from the group consisting of trabecular bone volume, trabeculae number, mineral apposition rate, cancellous bone volume, and bone length.

58. A method for determining a modulator of neuropeptide Y receptor associated bone growth comprising administering a modulator of bone growth to an animal subject and determining a change in Y receptor activity, wherein a modified Y receptor activity in the presence of the compound compared to the Y receptor activity in the absence of the compound indicates that the compound is a modulator of Y receptor associated bone growth.

59. A method for determining a modulator of neuropeptide Y receptor associated bone growth comprising administering a modulator of Y receptor activity and/or expression to an animal subject and determining a change in bone growth activity, wherein a modified bone growth activity in the presence of the compound compared to the bone growth activity in the absence of the compound indicates that the compound is a modulator of Y receptor associated bone growth.

60. The method according to any one of claims 42 to 59 wherein the animal subject has a level of bone growth activity that is about the same as an animal subject that has not been treated with a compound that modulates bone growth or has not been modified at the genetic level to reduce expression of a Y receptor-encoding gene other than a Y4 receptor.

61. The method according to any one of claims 42 to 59 wherein the animal subject has been modified at the genetic level to reduce expression of a Y receptor-encoding gene thereby enhancing its sensitivity to a modulator of bone growth activity.

62. The method of claim 61 wherein the animal subject has been modified at the genetic level to reduce expression of a Y4 receptor-encoding gene in at least one tissue thereof.

63. The method according to any one of claims 42 to 62 wherein the animal subject is a male subject.

64. The method of claim 43 wherein the compound is administered to a pregnant female animal subject for a time and under conditions for the compound to modulate Y receptor associated bone growth in a developing embryo and wherein the cells are isolated from the developing embryo.

65. The method according to any one of claims 42 to 64 wherein the animal subject is selected from the group consisting of rat, mouse, chimpanzee, chicken, guinea pig, rabbit, bovine, sheep, and zebrafish.

66. The method of claim 65 wherein the animal subject is a mouse.

67. The method according to any one of claims 40 to 65 wherein the Y receptor associated bone growth is associated with a Y receptor that is expressed external to the parenchyma of the central nervous system of an animal.

68. The method according to claim 67 wherein the Y receptor is at least expressed in the arcuate nucleus of an animal.

69. The method according to any one of claims 40 to 68 wherein the bone growth is associated with the activity and/or expression of one or more Y receptors selected from the group consisting of:

(i) a Y1 receptor;

(ii) a Y5 receptor;

(iii) a Y7 receptor;

(iv) a Y1 receptor and a Y2 receptor;

(v) a Y1 receptor and a Y5 receptor;

(vi) a Y1 receptor and a Y7 receptor;

(vii) a Y2 receptor and a Y5 receptor;

(viii) a Y2 receptor and a Y7 receptor;

(ix) a Y5 receptor and a Y7 receptor;

(x) a Y1 receptor and a Y2 receptor and a Y5 receptor;

(xi) a Y1 receptor and a Y2 receptor and a Y7 receptor;

(xii) a Y1 receptor and a Y5 receptor and a Y7 receptor; and

(xiii) a Y1 receptor and a Y2 receptor and a Y5 receptor and a Y7 receptor.

70. The method according to any one of claims 40 to 68 wherein the bone growth is at least associated with the activity and/or expression of a Y1 receptor.

71. The method according to claim 70 wherein the bone growth is associated with the activity and/or expression of one or more Y receptors selected from the group consisting of:

(i) a Y1 receptor; and

(ii) a Y1 receptor and a Y2 receptor.

72. The method according to any one of claims 40 to 71 further comprising determining the ability of the compound to pass across the blood brain barrier of an animal subject and selecting a compound that does not efficiently pass the blood brain barrier.

73. The method according to any one of claims 40 to 72 wherein the compound is a small molecule, nucleic acid, protein or antibody that antagonizes the activity and/or expression of a Y receptor.

74. The method of claim 73 wherein the nucleic acid comprises siRNA, PNA, RNAi, ribozyme or antisense RNA.

75. A method for determining a modulator of neuropeptide Y receptor associated adiposity comprising:

(xi) determining the level of neuropeptide Y receptor associated adiposity in the presence of a candidate compound; and

(xii) determining the level of neuropeptide Y receptor associated adiposity in the absence of a candidate compound,

wherein a difference in the level of said neuropeptide Y receptor associated adiposity at (i) and (ii) indicates that the candidate compound is a modulator of Y receptor associated adiposity.

76. The method of claim 75 comprising:

(i) determining the level of neuropeptide Y receptor activity and/or expression and the level of adiposity in the presence of a candidate compound; and

(ii) determining the level of neuropeptide Y receptor activity and/or expression and the level of adiposity in the absence of a candidate compound,

wherein a difference in the level of said neuropeptide Y receptor activity and/or expression and a difference in the level of adiposity at (i) and (ii) indicates that the candidate compound is a modulator of Y receptor associated adiposity.

77. The method of claim 76 further comprising isolating cells from an animal subject and then determining Y receptor activity and/or expression in the presence and absence of the compound using the isolated cells.

78. The method of claim 76 further comprising administering the compound to an animal subject isolating cells from an animal subject and then determining Y receptor activity and/or expression in the isolated cells.

79. The method according to claim 77 or 78 wherein Y receptor activity is determined by performing a process comprising contacting a receptor ligand with the cells in the presence and absence of the compound under conditions sufficient for the ligand to bind to a Y receptor expressed in said cells and determining the binding of the

ligand to the Y receptor wherein a difference in binding in the presence and absence of the compound indicates that the compound is a modulator of Y receptor activity.

80. The method of claim 79 wherein the ligand is labeled with a detectable marker.

81. The method of claim 79 or 80 wherein the ligand is selected from the group consisting of neuropeptide Y (NPY), pancreatic polypeptide and peptide YY (PYY).

82. The method according to claim 77 or 78 wherein Y receptor activity is determined by performing a process comprising exposing the cells to an amount of forskolin sufficient in the presence and absence of the compound to induce cAMP accumulation in the cells and determining the amount of cAMP in the cells wherein a difference in cAMP in the presence and absence of the compound indicates that the compound is a modulator of Y receptor activity.

83. The method of claim 77 or 78 wherein Y receptor activity is determined by performing a process comprising determining calcium mobilization in the cells wherein a difference in calcium mobilization in the presence and absence of the compound indicates that the compound is a modulator of Y receptor activity.

84. The method of claim 83 wherein calcium mobilization is determined by contacting the cells with a cell-permeable marker that binds intracellular free Ca^{2+} under conditions sufficient for the marker to permeate the cells and then determining the intracellular amount of $Ca2^{+}$ bound to the marker.

85. The method of claim 84 wherein the cell-permeable marker is a fluorescently-labeled marker.

86. The method of claim 76 further comprising determining the amount of adipose tissue in an animal subject.

87. The method according to claim 86 wherein the adipose tissue comprises white adipose tissue.

88. The method according to claim 86 or 87 wherein the ratio of white adipose tissue to brown adipose tissue is determined.

89. A method for determining a modulator of neuropeptide Y receptor associated adiposity comprising administering a modulator of adiposity to an animal subject and determining a change in Y receptor activity, wherein a modified Y receptor activity in the presence of the compound compared to the Y receptor activity in the absence of the compound indicates that the compound is a modulator of Y receptor associated adiposity.

90. A method for determining a modulator of neuropeptide Y receptor associated adiposity comprising administering a modulator of Y receptor activity and/or expression to an animal subject and determining a change in adiposity, wherein a modified adiposity in the presence of the compound compared to the adiposity in the absence of the compound indicates that the compound is a modulator of Y receptor associated adiposity.

91. The method according to any one of claims 77 to 90 wherein the animal subject has a level of adiposity that is about the same as an animal subject that has not been treated with a compound that modulates adiposity or has not been modified at the genetic level to reduce expression of a Y receptor-encoding gene other than a Y4 receptor-encoding gene.

92. The method according to any one of claims 77 to 91 wherein the animal subject is a gonadectomized animal subject.

93. The method according to any one of claims 77 to 94 wherein the animal subject is a male subject.

96. The method according to any one of claims 77 to 95 wherein the animal subject is selected from the group consisting of rat, mouse, chimpanzee, chicken, guinea pig, rabbit, bovine, sheep, and zebrafish.

97. The method of claim 96 wherein the animal subject is a mouse.

98. The method according to any one of claims 75 to 97 wherein the Y receptor associated adiposity is associated with a Y receptor that is expressed external to the parenchyma of the central nervous system of an animal.

99. The method according to claim 33 wherein the Y receptor is at least expressed in the arcuate nucleus of an animal.

100. The method according to any one of claims 75 to 99 wherein the adiposity is associated with the activity and/or expression of one or more Y receptors selected from the group consisting of:

(i) a Y7 receptor;
(ii) a Y1 receptor and a Y2 receptor;
(iii) a Y1 receptor and a Y4 receptor;
(iv) a Y1 receptor and a Y5 receptor;
(v) a Y1 receptor and a Y7 receptor;
(vi) a Y2 receptor and a Y4 receptor;
(vii) a Y2 receptor and a Y5 receptor;
(viii) a Y2 receptor and a Y7 receptor;
(ix) a Y4 receptor and a Y5 receptor;
(x) a Y4 receptor and a Y7 receptor;
(xi) a Y5 receptor and a Y7 receptor;
(xii) a Y1 receptor and a Y2 receptor and a Y4 receptor;
(xiii) a Y1 receptor and a Y2 receptor and a Y5 receptor;
(xiii) a Y1 receptor and a Y2 receptor and a Y7 receptor;

(xiv) a Y1 receptor and a Y4 receptor and a Y5 receptor;

(xv) a Y1 receptor and a Y4 receptor and a Y7 receptor;

(xvi) a Y1 receptor and a Y5 receptor and a Y7 receptor;

(xvii) a Y2 receptor and a Y4 receptor and a Y5 receptor;

(xviii) a Y2 receptor and a Y4 receptor and a Y7 receptor;

(xix) a Y2 receptor and a Y5 receptor and a Y7 receptor;

(xx) a Y4 receptor and a Y5 receptor and a Y7 receptor; and

(xxi) a Y1 receptor and a Y4 receptor and a Y5 receptor and a Y7 receptor.

101. The method according to any one of claims 75 to 99 wherein the adiposity is at least associated with the activity and/or expression of a Y7 receptor.

102. The method according to any one of claims 75 to 99 wherein the adiposity is associated with the activity and/or expression of a Y2 receptor and a Y4 receptor.

103. The method according to any one of claims 75 to 102 further comprising determining the ability of the compound to pass across the blood brain barrier of an animal subject and selecting a compound that does not efficiently pass the blood brain barrier.

104. The method according to any one of claims 75 to 103 wherein the compound is a small molecule, nucleic acid, protein or antibody that antagonizes the activity and/or expression of a Y receptor.

105. The method of claim 104 wherein the nucleic acid comprises siRNA, PNA, RNAi, ribozyme or antisense RNA.

106. A method of determining a compound that is a modulator of Y receptor associated differentiation of a mesenchymal stem cell (MSC) or bone marrow stromal cell (BMSC) into an osteoblast-type cell comprising:

(i) culturing a MSC or BMSC in the presence of a candidate compound;

(ii) culturing a MSC or BMSC in the absence of the candidate compound; and

(iii) determining Y receptor activity and/or expression and the number of differentiated osteoblast-type cells at (i) and (ii), wherein a modified number of osteoblast-type cells and a modified Y receptor activity and/or expression at (i) and (ii) indicates that the compound is a modulator of Y receptor associated differentiation of an osteoblast-type cell.

107. A method of determining a compound that is a modulator of Y receptor associated differentiation of a mesenchymal stem cell (MSC) or bone marrow stromal cell (BMSC) into an adipocyte-type cell comprising:

(i) culturing a MSC or BMSC in the presence of a candidate compound;

(ii) culturing a MSC or BMSC in the absence of the candidate compound; and

(iii) determining Y receptor activity and/or expression and the number of differentiated adipocyte-type cells at (i) and (ii), wherein a modified number of adipocyte-type cells and a modified Y receptor activity and/or expression at (i) and (ii) indicates that the compound is a modulator of Y receptor associated differentiation of an adipocyte-type cell.

108. The method of claim 106 or 107 further comprising isolating the MSC or BMSC from an animal subject.

109. The method according to claim 108 wherein the MSC or BMSC are isolated from bone marrow of the subject.

110. The method according to claim 108 wherein the MSC or BMSC are isolated from adipose tissue of the subject.

111. The method according to any one of claims 108 to 110 wherein animal subject is a human.

112. The method according to any one of claims 108 to 110 wherein the animal subject is a gonadectomized animal subject.

113. The method according to any one of claims 108 to 112 wherein the animal subject is a male subject.

114. The method according to any one of claims 108 to 110 wherein the animal subject is selected from the group consisting of rat, mouse, chimpanzee, chicken, guinea pig, rabbit, bovine, sheep, and zebrafish.

115. The method of claim 114 wherein the animal subject is a mouse.

116. The method according to any one of claims 106 to 115 wherein the Y receptor associated differentiation is associated with a Y receptor that is expressed external to the parenchyma of the central nervous system of an animal.

117. The method according to claim 116 wherein the Y receptor is at least expressed in the arcuate nucleus of an animal.

118. The method according to any one of claims 106 to 117 wherein the differentiation is associated with the activity and/or expression of one or more Y receptors selected from the group consisting of:

(i) a Y1 receptor;
(ii) a Y5 receptor;
(iii) a Y7 receptor;
(iv) a Y1 receptor and a Y2 receptor;
(v) a Y1 receptor and a Y5 receptor;
(vi) a Y1 receptor and a Y7 receptor;
(vii) a Y2 receptor and a Y5 receptor;
(viii) a Y2 receptor and a Y7 receptor;
(ix) a Y5 receptor and a Y7 receptor;
(x) a Y1 receptor and a Y2 receptor and a Y5 receptor;
(xi) a Y1 receptor and a Y2 receptor and a Y7 receptor;

(xii) a Y1 receptor and a Y5 receptor and a Y7 receptor; and

(xiii) a Y1 receptor and a Y2 receptor and a Y5 receptor and a Y7 receptor.

119. The method according to any one of claims 106 to 118 further comprising determining the ability of the compound to pass across the blood brain barrier of an animal subject and selecting a compound that does not efficiently pass the blood brain barrier.

120. The method according to any one of claims 106 to 119 wherein the compound is a small molecule, nucleic acid, protein or antibody that antagonizes the activity and/or expression of a Y receptor.

121. The method of claim 120 wherein the nucleic acid comprises siRNA, PNA, RNAi, ribozyme or antisense RNA.

122. A non-naturally occurring transformed animal having reduced expression of multiple Y receptors in a cell or tissue by virtue of carrying insertions in multiple Y receptor-encoding genes wherein said animal has modulated bone remodeling activity compared to an otherwise isogenic animal that does not carry the insertions.

123. A non-naturally occurring transformed animal having reduced expression of multiple Y receptors in a cell or tissue by virtue of carrying insertions in multiple Y receptor-encoding genes wherein said animal has modulated bone growth activity compared to an otherwise isogenic animal that does not carry the insertions.

124. A non-naturally occurring transformed animal having reduced expression of multiple Y receptors in a cell or tissue by virtue of carrying insertions in multiple Y receptor-encoding genes wherein said animal has modulated adiposity compared to an otherwise isogenic animal that does not carry the insertions.

125. The non-naturally occurring transformed animal according to any one of claims 122 to 124 wherein the multiple Y receptor encoding genes carrying the insertions are selected from the group consisting of:

(i) a Y1 receptor and a Y2 receptor;

(ii) a Y1 receptor and a Y5 receptor;

(iii) a Y1 receptor and a Y7 receptor;

(iv) a Y2 receptor and a Y5 receptor;

(v) a Y2 receptor and a Y7 receptor;

(vi) a Y5 receptor and a Y7 receptor;

(vii) a Y1 receptor and a Y2 receptor and a Y5 receptor;

(viii) a Y1 receptor and a Y2 receptor and a Y7 receptor;

(ix) a Y1 receptor and a Y5 receptor and a Y7 receptor; and

(x) a Y1 receptor and a Y2 receptor and a Y5 receptor and a Y7 receptor.

126. The non-naturally occurring transformed animal according to any one of claims 122 to 124 wherein the multiple Y receptor encoding genes carrying the insertions are selected from the group consisting of:

(i) a Y1 receptor and a Y2 receptor;

(ii) a Y2 receptor and a Y4 receptor; and

(iii) a Y1 receptor and a Y2 receptor and a Y4 receptor.

127. The non-naturally occurring transformed animal according to any one of claims 122 to 126 wherein the animal is a mouse.

128. A progeny animal of the non-naturally occurring transformed animal according to any one of claims 122 to 127 wherein said progeny animal has reduced expression of multiple Y receptors in a cell or tissue by virtue of carrying insertions in multiple Y receptor-encoding genes.

129. Use of the non-naturally occurring transformed animal according to any one of claims 122 to 128 or the progeny animal of claim 125 to determine bone remodeling

activity, bone growth or adiposity or an effect of a compound on bone remodeling activity, bone growth or adiposity.

130. Use of a non-naturally occurring transformed animal or progeny thereof having reduced expression of a Y4 receptor in a cell or tissue by virtue of carrying an insertion in the Y4 receptor-encoding gene to determine bone remodeling activity, bone growth or adiposity or an effect of a compound on bone remodeling activity, bone growth or adiposity.

131. A method of treatment of aberrant bone remodeling in a subject in need of treatment comprising administering to the subject an amount of a compound that modulates Y receptor associated bone remodeling sufficient to modulate Y receptor bone remodeling in a cell of the subject.

132. The method of claim 131 wherein the aberrant bone remodeling is associated with a bone disorder selected from the group consisting of osteomalacia, hyperostosis, osteoporosis, a bone segmental defect, periodontal defect, metastatic bone disease, and osteolytic bone disease.

133. The method of claim 132 wherein the compound enhances Y receptor associated bone remodeling.

134. The method of claim 131 wherein the aberrant bone remodeling is associated with osteopetrosis.

135. The method of claim 135 wherein the compound antagonizes Y receptor associated bone remodeling.

136. The method according to any one of claims 131 to 135 wherein the subject is a female subject.

137. The method according to any one of claims 131 to 135 wherein the subject is a male subject.

138. A method of treatment of aberrant adiposity in a subject in need of treatment comprising administering to the subject an amount of a compound that modulates Y receptor associated adiposity sufficient to modulate Y receptor adiposity in a cell of the subject.

139. A method of treatment of aberrant bone remodeling in a subject in need thereof comprising isolating a mesenchymal stem cell (MSC) or bone marrow stromal cell (BMSC) from a human or animal subject, treating the MSC or BMSC with a compound that modulates Y receptor associated differentiation under conditions sufficient to induce differentiation of the MSC or BMSC into an osteoblast type cell and introducing the osteoblast type cell into the subject in need of treatment.

140. The method of claim 139 wherein the aberrant bone remodeling is associated with a bone disorder selected from the group consisting of osteomalacia, hyperostosis, osteoporosis, a bone segmental defect, periodontal defect, metastatic bone disease, and osteolytic bone disease.

141. The method of claim 140 wherein the compound enhances Y receptor associated MSC or BMSC differentiation into an osteoblast type cell.

142. The method of claim 139 wherein the aberrant bone remodeling is associated with osteopetrosis.

143. The method of claim 142 wherein the compound antagonizes Y receptor associated MSC or BMSC differentiation into an osteoblast type cell.

144. The method according to any one of claims 139 to 143 wherein the subject is a female subject.

145. The method according to any one of claims 139 to 143 wherein the subject is a male subject.

146. The method according to any one of claims 139 to 145 further comprising expanding or growing the BMSC cells, MSC cells or osteoblast type cells.

147. The method according to any one of claims 139 to 146 comprising introducing differentiated osteoblast type cells directly into the bone of the subject.

148. The method of claim 147 wherein the osteoblast type cells are introduced to the subject by surgical means.

149. The method of claim 147 wherein the osteoblast type cells are introduced to the subject by infusing the cells into the blood stream of the subject under conditions sufficient for said osteoblast type cells to be recruited to a bone of the subject.

150. Use of an antagonist of Y receptor associated bone remodeling in the preparation of a medicament for the treatment of aberrant bone remodeling in an animal or human subject.